

SUPERVISOR OF SHIPBUILDING,
CONVERSION AND REPAIR, USN
PORTSMOUTH, VIRGINIA

TEST MEMORANDUM

SHEET 1 OF 19

SUPSHIP PORTSMOUTH, VA		TM-3782				REV		
TITLE: TUBINE DRIVEN FUEL OIL SERVICE PUMP		PREPARED BY: J. BREWBAKER				DATE 12/4/02		
		SUPERVISOR: <i>[Signature]</i>				DATE 12/4/02		
		CHECKED BY: <i>[Signature]</i>				DATE 12/4/02		
		SHIP (*)						
REVISIONS								
APPROVED								
DATE								

(*) TO BE DETERMINED AT TIME OF TEST

1. REFERENCES

- A. NAVSEA 0947-188-1010, NAVSEA EQUIPMENT MANUAL, TURBINE DRIVEN FUEL OIL SERVICE PUMP.

NOTE: ADDITIONAL CRITERIA AND DATA ACCEPTANCE SHEET(S) TO BE ADDED BY TESTING ACTIVITY AS REQUIRED FOR NUMBER OF UNITS.

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B. ENGINEERING OPERATIONAL SEQUENCING SYSTEM (EOSS).

C. FEDERAL SPECIFICATION FF-B-171A

NOTE: ADDITIONAL CRITERIA AND DATA ACCEPTANCE SHEET(S) TO BE ADDED BY TESTING ACTIVITY AS REQUIRED FOR NUMBER OF UNITS.

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TEST MEMORANDUM

REVISIONS					
REV	SH	DESCRIPTION	PREP'D	APVD	DATE

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2. TEST EQUIPMENT

- 2.1 CONTACT THERMOMETERS AS REQUIRED**
- 2.2 STROBELIGHT OR HAND TACHOMETER (CAPABLE OF MEASURING 16,000 RPM)**
- 2.3 STOP WATCH**
- 2.4 ALL TEST METERS, GAGES, AND EQUIPMENT REQUIRED FOR RECORDING TEST DATA SHALL BE FURNISHED BY THE CONTRACTOR AND CERTIFIED TO BE IN CURRENT CALIBRATION.**
- 2.5 ALL REQUIRED GAGES MUST BE INSTALLED ON THE UNIT AND WILL BE MONITORED AS TEST INSTRUMENTS DURING TESTING.**

NOTE: GAGES AND THERMOMETERS THAT ARE PART OF THE UNIT, IF NOT INSTALLED, CONTRACTOR TO FURNISH.

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TEST MEMORANDUM

3. GENERAL DATA

3.1 PUMP

MANUFACTURER DELAVAL TURBINE INC.
IMO PUMP DIV.
MANUFACTURER PART NO..... C6UEC-187
CAPACITY 37 GPM
SPEED RPM 1510-2110
SIZE..... 2" SUCT. X 1½" DISCH.
BHP 11.5
LIQUID FUEL OIL (DFM)TER
DISCHARGE PRESSURE..... 350 PSIG
SUCTION LIFT, "HG 5

3.2 TURBINE

MANUFACTURER DELAVAL TURBINE INC.
TYPE HC-RE
MAX. INLET STEAM PRESSURE 575 PSIG
INLET PRESS. AT GOV. VALUE 575 PSIG
EXHAUST PRESSURE 15 PSIG
STEAM TEMPERATURE (NORMAL) 705°F
MAX STEAM TEMPERATURE 725°F
RATED OPERATING SPEED 4660-6520 RPM
..... 533-660
TOTAL STEAM CONSUMPTION LBS/HR.....
WATER TEMP. TO L.O. COOLER 85°

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3.4 EXISTING NAMEPLATE DATA:

3.4.1 PUMP:

3.4.2 TURBINE:

3.4.3 FLEXIBLE COUPLING:

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4. SAFETY PRECAUTIONS

- 4.1 SUITABLE PRECAUTIONS SHALL BE TAKEN DURING ALL TESTS AND PREPARATION FOR TESTS TO PREVENT INJURY TO PERSONNEL OR DAMAGE TO THE VESSEL.
- 4.2 ALL NECESSARY ADJUSTMENTS TO THE FUEL OIL SERVICE PUMP AND COMPONENTS SHALL BE MADE DURING TEST AS NECESSARY TO ASSURE PROPER OPERATION.
- 4.3 TEST CREW TO INSPECT THE FUEL OIL SERVICE PUMP AND COMPONENTS TO DETERMINE READINESS FOR TEST AND CONFORMANCE TO TECHNICAL MANUAL. REPORT ANY DISCREPANCIES TO THE SUPERVISOR.
- 4.4 PERSONNEL SHALL NOT BE PERMITTED IN THE TEST AREA EXCEPT AS NECESSARY TO ACCOMPLISH TEST REQUIREMENTS.
- 4.5 IN CASE OF UNUSUAL NOISE OR VIBRATION, SHUT DOWN THE EQUIPMENT.
- 4.6 DO NOT WEAR LOOSE CLOTHING WHEN WORKING WITH ROTATING MACHINERY.
- 4.7 DO NOT WIPE DOWN IN VICINITY OF ROTATING PARTS.
- 4.8 ANY OIL SPILLAGE SHALL BE WIPED UP AT ONCE.
- 4.9 AVOID GETTING OIL ON HOT SURFACES AND LAGGED AREAS.
- 4.10 DO NOT TAKE UP JOINTS UNDER PRESSURE.
- 4.11 NEVER ATTEMPT TO MANUALLY ROTATE PUMP WITH STEAM INLET VALVE OPEN.
- 4.12 DO NOT RUN PUMP IN DRY CONDITION.
- 4.13 DO NOT USE TEST EQUIPMENT KNOWN TO BE IN POOR CONDITION.
- 4.14 TEST CREW WILL BE PROPERLY OUTFITTED WITH SAFETY EQUIPMENT AS REQUIRED (i.e., SAFETY HELMET, GLASSES, SHOES, GLOVES, PADDED VEST, ETC.).

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5. GENERAL INFORMATION

5.1 PURPOSE

- 5.1.1 PURPOSE OF CONDUCTING THIS TEST IS TO EVALUATE THE OVERALL CONDITION OF THE FUEL OIL SERVICE PUMP; THIS ACCEPTANCE CERTIFICATION IS DETERMINED WHEN SATISFACTORY PERFORMANCE HAS BEEN ACHIEVED WITH ADEQUATE ASSURANCE OF SAFE AND RELIABLE OPERATION.
- 5.1.2 THIS TEST MEMORANDUM IS TO BE UTILIZED BY THE CONTRACTOR AND THE SUPERVISOR AS A PROCEDURAL GUIDE IN CONDUCTING ACCEPTANCE TESTS ON THE FUEL OIL SERVICE PUMP.
- 5.1.3 SUBMIT ONE (1) COMPLETED COPY OF THIS TEST MEMORANDUM, WITH RECORDED DATA AND ANY ATTACHMENTS TO SUPSHIP CODE 240. (ATTACHMENTS DEFINED AS DATA SHEETS REQUIRED IN EXCESS OF THOSE FURNISHED WITH TEST, PROBLEMS ENCOUNTERED, SOLUTIONS PROVIDED, DEVIATIONS GRANTED, ETC.)

5.2 PROCEDURE

- 5.2.1 SECTION 6 COMPRISES PREREQUISITE ITEMS WHICH ARE TO BE PERFORMED OR ACCOMPLISHED BY COGNIZANT CONTRACTOR PRIOR TO CONDUCTING TEST ITEMS IN SECTION 7. APPLICABLE DATA TAKEN IS TO BE FURNISHED TO THE SUPERVISOR.
- 5.2.2 SECTION 7 COMPRISES ACCEPTANCE CERTIFICATION TEST ITEMS WHICH ARE TO BE ACCOMPLISHED WITH THE SUPERVISOR PRESENT AND WITNESSED BY THE SHIP'S DESIGNATED REPRESENTATIVE.
- 5.2.3 TEST ITEMS ARE TO BE SEQUENTIALLY PERFORMED. ANY DEVIATION WILL BE AT THE DISCRETION OF THE SUPERVISOR.
- 5.2.4 THE INFORMATION REQUIRED BY DATA SHEETS SHALL BE RECORDED AT INTERVALS INDICATED THROUGHOUT THE ENTIRE TEST. ADDITIONAL COPIES OF THE DATA SHEETS ARE TO BE USED IF REQUIRED.

5.3 RESPONSIBILITIES

5.3.1 SUPERVISOR

- 5.3.1.1 SECTION 7 OF THIS TEST MEMORANDUM IS NOT TO BE INITIATED, INTERRUPTED OR TERMINATED WITHOUT THE SPECIFIC KNOWLEDGE AND CONSENT OF THE SUPERVISOR.

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5.3.2 CONTRACTOR

- 5.3.2.1 THE CONTRACTOR IS TO ACCOMPLISH ALL PREREQUISITE ITEMS IN SECTION 6 UNDER THEIR COGNIZANCE PRIOR TO CONDUCTING TEST ITEMS IN SECTION 7.
- 5.3.2.2 THE CONTRACTOR IS TO ENSURE THAT THE UNIT IS PROPERLY INSTRUMENTED AS REQUIRED BY THIS TEST MEMORANDUM AND PROVIDE ADDITIONAL INSTRUMENTATION AS MAY BE REQUESTED BY THE SUPERVISOR.
- 5.3.2.3 THE CONTRACTOR IS TO ENSURE THAT ALL PREREQUISITE ITEMS IN SECTION 6 HAVE BEEN SATISFACTORILY COMPLETED AND THAT THE UNIT IS OPERATIONAL, READY AND AVAILABLE FOR ACCOMPLISHMENT OF TEST ITEMS IN SECTION 7. NOTIFY THE SUPERVISOR AND THE ENGINEERING OFFICER OF THE TEST SCHEDULE AND ENSURE THAT THE COGNIZANT SHOP AND SHIP PERSONNEL WILL BE ON HAND TO OPERATE THE EQUIPMENT AND REQUEST THAT THE SHIP'S DESIGNATED REPRESENTATIVE BE PRESENT TO WITNESS TESTING.

5.3.3 SHIP

- 5.3.3.1 THE SHIP IS TO PROVIDE QUALIFIED PERSONNEL TO OPERATE THE EQUIPMENT AND A DESIGNATED REPRESENTATIVE WHO WILL WITNESS ALL TESTING.
- 5.3.3.2 SHIP'S DESIGNATED REPRESENTATIVE WILL SIGN THE APPLICABLE EQUIPMENT DATA SHEETS ON COMPLETION OF SATISFACTORY TEST.
- 5.3.3.3 THE TEST ACCEPTANCE CERTIFICATION SHEET, "TEST MEMORANDUM APPROVAL" SHEET 19 SHALL BE SIGNED BY THE ENGINEERING OFFICER OR HIS DESIGNATED REPRESENTATIVE AFTER IT IS DETERMINED THAT ALL ITEMS HAVE BEEN SATISFACTORILY COMPLETED AND MEET THE SPECIFIED REQUIREMENTS OF THIS TEST MEMORANDUM.

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TEST MEMORANDUM

6. TEST PREREQUISITES

6.1 TEST INSTRUMENTATION CALIBRATION VERIFICATION

- 6.1.1 RECORD THE TYPE, MANUFACTURER, SERIAL NUMBER, CALIBRATION DATE, AND CALIBRATION EXPIRATION DATE OF TEST INSTRUMENTS ON SHEET 14.
- 6.1.2 VERIFY THAT THE UNIT IS PROPERLY INSTRUMENTED WITH THE REQUIRED GAGES AND TEST EQUIPMENT.

6.2 NAMEPLATE DATA

- 6.2.1 CHECK EQUIPMENT NAMEPLATES, IF INSTALLED, AND VERIFY THAT THE DATA CONCURS WITH SECTION 3, GENERAL DATA, OF THIS TEST MEMORANDUM.
- 6.2.2 RECORD EXISTING NAMEPLATE DATA FOR FUEL OIL SERVICE PUMP AND COMPONENTS ON SHEET 6 OF THIS TEST MEMORANDUM, IF DIFFERENT FROM THAT SPECIFIED ON SHEET 5.
- 6.2.3 RECORD SERIAL NUMBER OF MAIN FEED PUMP AND TURBINE IF OBTAINABLE ON SHEET 16.

6.3 VISUAL INSPECTION

- 6.3.1 CONDUCT AN INSPECTION TO CHECK THE CONDITION OF THE EQUIPMENT PRIOR TO TESTING.
- 6.3.2 CHECK THAT GAUGES AND THERMOMETERS ARE PROPERLY INSTALLED.
- 6.3.3 CHECK FOR PROPER SUPPORT OF EACH UNIT AND ITS ASSOCIATED COMPONENTS.
- 6.3.4 CHECK THAT ALIGNMENT OF PUMP TO TURBINE CONFORMS TO REFERENCE A.
- 6.3.5 CHECK TIGHTNESS OF CASING, JOINTS AND SEALS.
- 6.3.6 ROTATE PUMP MANUALLY TO ENSURE FREEDOM FROM BINDING OR RUBBING. (SEE SECTION 4.11)
- 6.3.7 CHECK THAT SUFFICIENT LAGGING IS IN PLACE.
- 6.3.8 CHECK THAT COOLING WATER IS AVAILABLE.
- 6.3.9 CHECK THAT LUBE OIL SUMP IS FILLED. ENSURE LEVEL GAGE INDICATES OIL LEVEL AT HIGH MARK AND LUBE OIL FILTERS ARE CLEAN.
- 6.3.10 CHECK THAT STEAM STRAINER IS CLEAN.

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- 6.3.11 VERIFY PLANT IS CAPABLE OF SUPPLYING STEAM AND MAINTAINING A CLOSED SYSTEM.
- 6.3.12 *VERIFY ALL PREREQUISITES IN REFIA.*
- 6.3.13 VERIFY PILOT VALVE (TO SPEED LIMITING GOVERNOR) IS OPEN AND IS PINNED IN THE OPEN POSITION.
- 6.3.14 VERIFY PUMP SUCTION AND DISCHARGE VALVES ARE LOCKED OPEN.
- 6.3.15 FOR EQUIPMENT ON WHICH NO REPAIR WORK WAS AUTHORIZED, MINOR REPAIRS OR ADJUSTMENTS NOT EXCEEDING THE ALLOTMENT OF FUNDS FOR THE TEST ARE TO BE ACCOMPLISHED BY THE CONTRACTOR.
- 6.3.16 FOR EQUIPMENT FOR WHICH REPAIR WORK HAS BEEN AUTHORIZED, ALL REPAIRS OR ADJUSTMENTS NOT COMPLETED ARE TO BE ACCOMPLISHED BY THE CONTRACTOR.
- 6.4 ALL TEST PREREQUISITES STEPS 6.1 THROUGH 6.3.15 HAVE BEEN COMPLETED.

SUPERVISOR _____ DATE _____

CONTRACTOR _____ DATE _____

SHIP'S REPRESENTATIVE _____ DATE _____

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7. TEST PROCEDURE

- 7.1 AFTER ALL PREREQUISITE CHECKS AND INSPECTIONS HAVE BEEN COMPLETED, LINE UP PUMP IN ACCORDANCE WITH REFERENCE 1.A.
- 7.2 VERIFY THAT THE EXHAUST RELIEF VALVE WILL LIFT AT +2 LBS. OVER AUXILIARY EXHAUST PRESSURE. RECORD ON SHEET 17.
- 7.3 DEMONSTRATE UNIT IS NOT A SELF-STARTER, RECORD ON SHEET 17.
- 7.4 START PUMP/TURBINE UNIT IN ACCORDANCE WITH REFERENCE 1.A.
- 7.4.1 OPERATE UNIT FOR A SUFFICIENT LENGTH OF TIME AS NECESSARY TO DETERMINE OVERALL TIGHTNESS AND OPERATING CONDITION (i.e., UNUSUAL NOISE, EXCESSIVE VIBRATION, GROSS LEAKAGE FROM PACKING GLANDS/SEALS, ETC. SHOULD BE PAID CLOSE ATTENTION TO FOR DETERMINATION OF EFFECTS ON TEST DATA).

7.5 RUNNING

- 7.5.1 CHECK LUBE OIL FLOW, PRESSURE AND TEMPERATURE AND RECORD ALL DATA AT 15 MINUTE INTERVALS ON SHEET 17. LUBE OIL TEMPERATURE SHOULD NEVER EXCEED 180°F AT LUBE OIL COOLER INLET, AND MUST BE MAINTAINED AT 125°F AT COOLER OUTLET.
- 7.5.2 MAINTAIN PROPER LUBE OIL LEVEL IN REDUCTION GEAR SUMP TANK.
- 7.5.3 DURING THE OPERATION OF THE UNIT, CHECK TURBINE CASE FLANGE, TURBINE GLANDS, STEAM, SALT WATER PIPING AND LUBE OIL SYSTEM PIPING FOR LEAKAGE.
- 7.5.4 VERIFY PROPER OPERATION OF THE SPEED LIMITING GOVERNOR IN ACCORDANCE WITH REF. 1.A.

SUPERVISOR _____ DATE _____

CONTRACTOR _____ DATE _____

SHIP'S REPRESENTATIVE _____ DATE _____

- 7.5.5 RECORD ALL INFORMATION REQUIRED ON SHEET 17.
- 7.5.6 CHECK FOR UNUSUAL NOISE OR VIBRATION.
- 7.5.7 WHEN TESTS ARE COMPLETE, SHUT DOWN AND PLACE UNIT IN NORMAL SECURE LINE-UP.

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7.6 VERIFY LUBE OIL RELIEF VLAVE WILL LIFT AT 35 PSIG.

SUPERVISOR _____ **DATE** _____

CONTRACTOR _____ **DATE** _____

SHIP'S REPRESENTATIVE _____ **DATE** _____

7.7 VERIFY SPEED LIMITING GOVERNOR WILL OPERATE BETWEEN (*).

SUPERVISOR _____ **DATE** _____

CONTRACTOR _____ **DATE** _____

SHIP'S REPRESENTATIVE _____ **DATE** _____

(*) ACCEPTANCE CRITERIA TO BE DETERMINED AT TIME OF TEST.

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7.10 TEST STATUS

- 7.10.1 TEST MAY BE DISCONTINUED AT THE DISCRETION OF THE SUPER-VISOR, SHOULD ANY TEST ITEM PROVE UNSATISFACTORY AND WOULD SERIOUSLY IMPEDE OR INVALIDATE RESULTANT DATA, OR IF A SAFETY HAZARD OCCURS.
- 7.10.2 IF IMMEDIATE CORRECTION OF AN UNSATISFACTORY TEST ITEM, PROBLEM OR CONDITION CAN BE MADE WITH MINIMAL TIME LOSS, RESUME OR RESCHEDULE TESTING.
- 7.10.3 THE JUDGEMENT OF THE SUPERVISOR IS TO BE CONSIDERED FINAL AS TO THE ACCEPTANCE OR REJECTION OF THE EQUIPMENT TESTED.

7.11 TEST LABEL PLATES

- 7.11.1 UPON SUCCESSFUL COMPLETION OF TEST, INSTALL NEW TEST LABEL PLATE AND ENTER DATE AND PLACE REQUIRED BY SHEET 18.

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TEST MEMORANDUM

TITLE: FUEL OIL SERVICE PUMP **SHIP:** (*)

SUPERVISOR: _____ **DATE:** _____

SHIP'S WITNESS: _____ **DATE:** _____

PUMP SERIAL NO.: _____ **TURBINE SERIAL NO.** _____

PUMP NO.: _____

PUMP DATA SHEET

OPERATION PARAMETER	ACCEPTANCE CRITERIA	REF	START	15 MIN	30 MIN	45 MIN	60 MIN	75 MIN	90 MIN
RPM	1510 - 2110	(A)							
SUCTION LIFT	5" HG	(A)							
DISCHARGE PRESSURE	350 PSIG	(A)							

REMARKS/DISCREPANCIES: _____

(*) TO BE FILLED IN AT TIME OF TEST

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TEST MEMORANDUM

SHIP: (*) _____ SUPERVISOR: _____
 EQUIPMENT: FUEL OIL SERVICE PUMP, T/D _____ SHIP'S FORCE: _____
 PUMP SERIAL NO. _____ TURBINE SERIAL NO. _____ DATE: _____
 CONTRACTOR: _____

OPERATING PARAMETERS	ACCEPTANCE CRITERIA	REFER-ENCES	MINUTES					
			00	15	30	45	60	75 90
SPEED	RPM	A						
STEAM PRESSURE	PSIG	A						
EXHAUST PRESSURE	PSIG	A						
PUMP SUCTION	PSIG	A						
PUMP DISCHARGE	PSIG	A						
OIL TO GOVERNOR	PSIG	A						
MAIN L.O. PRESS	PSIG	A						
FWD TRANSMISSION BRG TEMP	140° MAX	C						
AFT TRANSMISSION BRG TEMP	140° MAX	C						
		C						
		C						
LUBE OIL COOLER	IN 180° MAX							
IN/OUT DEG F.	OUT 125°	A						
COMBINATION EXH. REL VALVE	2 PSI OVER							
SPEED LIMITING GOV SETTING	AUX EXH. PSI	A						
UNIT NOT A SELF-STARTER	(*) RPM	A						
(*) TO BE FILLED IN AT TIME OF TEST	SAT	-						
			LIFTING PRESSURE			AUXILIARY EXH. PRES.		
			ACTUAL RPM			UNSATISFACTORY		
			SATISFACTORY					

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TITLE: FUEL OIL SERVICE PUMP

LABEL PLATE

NOTE: NOT TO BE INSTALLED OR STAMPED AS TESTED, UNTIL TEST HAS BEEN SATISFACTORILY COMPLETED.

- (a) REQUIRED**
- (b) LABEL PLATE TO BE .031" CRES, AND OF A SIZE SUITABLE QUANTITY AND STYLE OF LETTERING USED.**

FUEL OIL SERVICE PUMP, T/D

SUPSHIPS PORTSMOUTH TM-3782
NAVSEA TECH. MAN. NO. 0947-188-1010

DATE

PLACE

PLATE A

**PROVIDE 1 CRES
 LABEL PLATE AND
 INSTALL IN THE
 FOLLOWING LOCATION:
 ON FUEL OIL SERVICE
 PUMP FOUNDATION**

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TEST MEMORANDUM APPROVAL

SHIP: (*)

APPROVAL: TESTS HAVE BEEN ACCOMPLISHED IN ACCORDANCE WITH FOREGOING
TEST MEMORANDA AND THE EQUIPMENT IS CONSIDERED SATISFAC-
TORY SUBJECT TO COMMENTS, IF ANY, LISTED BELOW.

TEST TITLE: FUEL OIL SERVICE PUMP, T/D

SIGNATURES ARE REQUIRED ON COMPLETED MEMORANDA.

SHIP REPRESENTATIVE:

DATE:

SUPERVISOR:

DATE:

CONTRACTOR'S REPRESENTATIVE:

DATE:

(*) TO BE FILLED IN AT TIME OF TEST.